

## **Improvements to DIII-D Computer-Based Control and Data Acquisition Systems\***

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Computer-based control and data acquisition systems have long played a critical role in fusion research in the development and operation of experiments such as the DIII-D tokamak in San Diego. These systems require great flexibility in being able to control and tie together the many diverse systems that make up a tokamak, including power, cryogenics, vacuum, electrical, cooling, heating and computers. For well over a decade, the DIII-D control and data acquisition systems have been running on Linux-based commodity computing hardware. This has provided DIII-D with a continual path of improvement to computing performance and capability while maintaining the usefulness and productivity of numerous custom developed software applications written over the years. The flexibility provided by these Linux based systems has allowed DIII-D to continue to utilize and support legacy CAMAC hardware in addition to incorporating newer compact peripheral component interfaces (cPCI), Programmable logic controllers (PLC) and data acquisition hardware. A number of in-house developed tools and applications have made these systems highly customizable and easily expandable thus meeting the specific and growing needs of the DIII-D research program. Among the latest improvements to these systems have been upgrades to user interfaces, development of new control capabilities and increases to data acquisition capabilities. This paper will describe in detail the present state of the DIII-D computer based control and data acquisition systems and recent improvements that have been made.

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